THE SERVO-BULGARIAN WAR FROM A SURGICAL POINT OF VIEW.

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AT the commencement of hostilities early in November, 1885, the position of the forces at different times engaged was about as follows:

The main Servian army lay at Nisch and Pirot, and consisted of some 120,000 men. Opposing the Servians was a Bulgarian force at Zaribrod of about 20,000.

The main bulk of the Bulgarian army lay at Philipopolis, ready to meet the Turks, at least four days march from Sofia.

The Zaribrod force was gradually driven back to Slivnitza. This took one week, but the Servians were unable to proceed further on account of the break-down of the commissariat, thus allowing time for the main Bulgarian army to arrive. On its arrival in the second week of the month the battle of Slivnitza was fought, followed by the Servian retreat and the Bulgarian advance. The Dragoman Pass was forced, and the battle of Pirot fought. By the end of November the war was practically over.

BULGARIA.—At the outbreak of the war, what there was of an army medical department on this side, had made its arrangements for a campaign with Turkey. When war was suddenly declared with Servia their transport beasts were mostly required for more immediate uses, as the main force had to march about 360 kilometres to the seat of war. Consequently, even if the Army Medical Department had been capable of meeting the requirements of the forces, it was crippled, and when the strain came it collapsed. There were no trained orderlies to do the work; in fact, their Army Medical Department was in much the same condition as was the British when the Crimean war broke out, with the exception of the possession of most excellent ambulance wagons. These latter were able to carry two lying and two sitting.

Bernhardt. [Hahn operated.]	Berlin klin. Woch. 1882. No. 14, and Deutsch med. Woch. 1882. Nos. 9 and 29.	Aug. 1881.	F.	55.	L.	3 1-2 years.	Persistent drawing with a lens. See remarks.	Paralysis disappeared entirely in 5 mos.: twitching began after 7 mos.: after 10 mos. considerable twitching but not so bad as before.	Improvement to 10 mos. after operation.	Post. auric. nerve not paralysed: reac. of degeneration. [Godlee says it "followed *lupus* which caused contraction of eyelids." Bernhardt says it followed "nach anhaltendem Zeichnen *mit der Loupe* wobei das linke Auge besonders angestrengt würde." An amusing error of translation].
Gray. [Baum's method.]	Proc. Med. Soc. Kings Co., N. Y. VII. 1882. 127.	May 8, 1882.	M.	56.	R.	16 years.		This was a case of tic douloureux preceded by tic convulsif; pain relieved for four days, then worse than ever; twitching lessened: paralysis.	Unrelieved as to pain; twitchings improved after 3 mos.	Reac of degen
Gray. [Baum's method.]	Proc. Med. Soc. Kings Co., N. Y. VII. 1882. 127.	June 16, 1882.	M.	22.	R(L)	10 years.		Only right side stretched; paralysis.	Cure 3 months after operation.	Both hands also chorcic. Reac. of degen.
esas.	Wien Med. Woch. 1884. No. 2 and 1885. No. 27.	Nov 16, 1882	M.	37.	R.	8 years.	Cold.	No paralysis followed; spasms lessened and ceased Jan. 4, 1883. [7 weeks.] July 1885, still cured.	Cure 2 years and 8 months after operation.	No electrical change
ernhardt. evy operated)	Archiv. f. Psychiatrie und Nervenkrank. XV. p. 777. 1884.	Jan. 16, 1884.	M.	25.	R	4 1-2 years.	Cold.	Had paralysis of right face when first seen: after operation paralysis much diminished by April 1, 1884. By May 8. spasms returned almost as bad as ever. Voluntary power over some muscles had re-ed	Unrelieved of spasms 4 mos after operation: previous paralysis somewhat improved.	Reac. of Degen.

TABLE OF THE RECORDED CASES OF STRETCHING OF THE FACIAL NERVE.—*Continued.*

Reporter and Method.	*Reference.*	*Date.*	*Sex*	*Age and Side.*	*Duration of Disease.*	*Supposed Cause.*	*Temporary Result.*	*Final Result.*	*Remarks.*
Kaufmann. [Hueter's method.]	Centralbl. f. Chirurg. 1885. No. 3.	Sept. 16, 1884.	M.	61. R.	7 years.	Anger.	Incomplete paralysis; improvement for 4 days; on 5th day returned as bad as ever.	Unrelieved 4 mos. after operation.	Only part of nerve stretched. On 5th day same nerve divided without result.
Keen. [Baum's Method.]	This Journal.	April 2, 1886.	F.	46. R.	5 1-2 years.	Nervous trouble coincident with climacteric.	Paralysis; not lessened when reported and with no return o spasms.	Uncertain. Too early to report. (25 days) [2½ mo's after operation, still cured.]	Reac. of degen. on 10th day. Infra orbital nerve had previously been stretched without permanent relief.

Of these 21 cases there are males, 9; females, 11; unstated 1. The right nerve involved 11 times: the left 7, both sides 2, and side not stated, one. The age om 21 to 72. Four of them had undergone previous operations, (4, 10, 12, 21), first three section or resection of the supra-orbital and the last of the infra-ital nerve, with no permanent effect.

Davidson (Lancet, Jan. 28, 1882,) stretched the infra orbital nerve in a woman 33 for muscular spasms limited to the muscles of the region supplied by this ve. The spasms ceased in a fortnight. The case was reported about two ths after the operation.

The most accurate tables heretofore compiled, though not free from errors, are those of Godlee and Zesas That of Chandler (N. Y. Med. Record, Sept. 9, 1882) is exceedingly inaccurate. Kulenberg has only reported one case, and there is no such case as that of "Germon," while the rose-colored views of the results are not justified by the facts. Dr Harte in Agnew's Surg. (Vol. III) has used the tables of Chandler without verification (in that of mimic spasm at least,) and has repeated its errors. Moreover Harte's last four cases should be of the facial and not the inferior dental nerve.

Reason for the Operation.—All of the cases have been for more or less extensive tic non douloureux of the face, lasting from two to ten years. In two cases paralysis of the face preceded the convulsive tic, and in one case tic douloureux followed the tic convulsif. As Sturge has pointed out, the lesion in tic convulsif is probably central and not peripheral, though Kaufmann's curious case (see p. 14) would seem to show otherwise. In my own case the previous history points almost conclusively in this direction from the repeated and extensive paralyses. It might be objected, therefore, *in limine* that the operation should not be done since it can not reach the actual seat of the disease, and any interference with the nerve, the mere conductor of motor impulses would have to paralyze the muscles in order to effect the desired relief. The experiment of Godlee, in which he dissected out the spinal accessory and the facial and found that a slight pull on the former was immediately evident on the central side of the short, wide and straight jugular foramen, while traction on the facial even to rupture of the nerve was not perceptible at the central end of the long, narrow and curved aqueductus Fallopii, proves that no central alteration can be urged in favor of the operation on the seventh nerve, although in one case (4) taste was lost for fifteen weeks. But *per contra*, while the expected paralysis nearly always follows, as I shall show, it always disappears in time, and the relief of the tic that has followed in a good proportion of the cases, gives a reasonable ground for the operation.

Method of Operating.—Two methods have been proposed, that of Baum and that of Hueter. In the former the incision is made behind the ear by an angular incision $2^1/_2$ inches long, the apex being at the apex of the mastoid process. The parotid is the first land mark. Its posterior border is dissected and pushed forward by a grooved director and forceps till the shining aponeurosis of origin of the sterno-cleido is seen as the second land mark. The interspace between these two is cleared to the depth of 1 or $1^1/_2$ inches, when the prevertebral muscles and their anterior fascial covering is the next land mark. The nerve lies in front of this fascia. Sometimes the posterior belly of the digastric is seen. The transverse processes of the vertebræ and the styloid process can both be

felt and are valuable as additional guides. This space between the mastoid process and the superior ramus of the jaw is quite narrow and deep. It will barely admit the finger. Hence a good side light is essential, and I found great help from a student lamp and a forehead mirror held by Dr. Sinkler, which illuminated the deeper parts admirably. The chief trouble is to find the exact spot at which the nerve crosses this space on its way from the stylo-mastoid foramen to enter the parotid. Dissection will always reveal it, but in order to avoid needless injury and abridge the search, I found the use of a weak Faradaic current very useful. A strong current at any point in the moist state of the wound will produce muscular spasm at once, but a very weak current will only do so when the nerve is touched. A wet sponge was held on the cheek and the wire end of the other cord was touched at successive points till the nerve was easily detected when its white trunk was quickly laid bare. While being stretched the twitching produced by it should be noted to see whether all the branches have been stretched. If any escape the muscles supplied by them will not twitch when the nerve is stretched, and also spontaneous convulsive movements will sometimes recur in the muscles whose nerve branches have not been stretched even during etherization and so point out what branches have escaped.

The other method is that of Hueter by an incision in front of the ear 2 inches long, its middle at the level of the upper part of the lobule. The parotid is at once disclosed. The incision is carried more and more deeply till at about $\frac{1}{4}$ of an inch, one of the two main branches of the nerve is reached. Further dissection will soon reveal the second branch and at their junction the main trunk. If it is desired to dissect back to the foramen a second short incision at right angles to the first must be made posteriorly.

Of the two methods that of Baum is by far the better. In the first place, its scar is hidden by the ear, and especially in a woman this is very desirable. Secondly, it is far less bloody. Usually only the posterior auricular artery is cut, and possibly one or two other small vessels. Whereas, in Hueter's there are usually a number of glandular branches requiring ligature. Thirdly, much less damage to the gland and other

tissues is inflicted. Fourthly and chiefly, the nerve is reached directly at its emergence from the stylo-mastoid foramen before it has given off any branches except, possibly, the posterior auricular, an unimportant branch. How important this advantage is, is best shown by Kaufmann's case, in which he operated by Hueter's method. His first stretching disclosed the fact that he had not gone far enough back, for the frontalis and orbicularis palpebrum were not paralysed. Enlarging the wound upward and downward (it should have been backwards) a second stretching gave the same result. On the fifth day the twitching was as bad as ever, and he wished to do Baum's operation, but the patient would not consent to a second scar, so he opened the original wound, found the injected nerve and divided it. The wound promptly healed but no benefit resulted, and the patient went home worse than he came, for he not only had the twitching but his cheek and mouth were also paralyzed.

What light this case may throw upon the pathology of the disease I am hardly able to say. It certainly would seem to point to a peripheral cause for the spasms.

In Hoffmann's case also the muscles of the under lip and the platysma were not paralyzed, and in Eulenberg's and Hahn's cases the posterior auricular branch was not affected.

I have only had opportunity to compare the two methods upon the cadaver. The result of a score of trials is decidedly in favor of Baum's method except in the case of performance from the lesser room and greater depth, in which particulars, Hueter's is the better operation. But these should not weigh in view of the reasons before stated.

The nerve being found *how* shall it be stretched, *in what direction* and with *what force?*

I have found an ordinary blunt hook an excellent means and no other instrument seems necessary.

As to *direction*, I stretched it chiefly from the periphery toward the centre as well as the hook would allow, both because no stretching on the central end would affect the medulla and because as Marcus has shown traction on the central end of a mixed nerve abolished sensibility while traction on the peripheral end abolished both motion and sensation, and the motor effect was here desired.

The *amount of force* to be used is as yet undetermined. Gray estimated it in his case at 6 to 7 pounds; Southam at 4 to 5 pounds, and in my own case it was estimated at 4 to 5 pounds. It was not enough to lift the head of the patient (which would probably weigh 6 to 7 pounds), for on carefully attempting to do this, before the head could be lifted I felt a few fibres giving way and I at once desisted. The head, however, was rolled from left to right quite forcibly.

Putnam records an interesting experiment on a dog. The facial has two branches, each about equal in size to the main trunk in man. One of these broke at 40 pounds. A much less weight would have broken the nerve in my patient, and in several cadavera injected and condensed by the chloride of zinc the attempt to lift the head caused rupture of the nerve. The dog above alluded to was then allowed to come partially out of the anæsthesia and the other branch was stretched. At 7 pounds the motion of the eyelid was impaired, a second pull of 8 pounds produced complete palsy which disappeared on the second day. Putnam recommends that the patient should be allowed partially to recover from the ether to judge of the effects of the pull and that two pulls of about 7 and 6 pounds be the limit imposed unless symptoms be so severe that prolonged palsy be desired. My own impression is that this is too great a force and that it can be best achieved empirically, the attempt being made to lift the head (6 to 7 pounds) and being abandoned the moment any fibres give way.

In Eulenberg's case the nerve was physically disorganized by the stretching, yet the paralysis disappeared in three months and the spasms returned, though with abated force. Schüssler states that in his case, after three or four pulls, the nerve lay in a small loop in the cavity of the wound, yet the palsy disappeared in twelve weeks and the spasms partially returned after six months.

The effects of slight and of severe stretching differ materially. As has been shown by Haber, Ranke, Cornet and others slight stretching either has no influence on the irritability of the nerve or even increases it, whereas greater stretching diminishes it or destroys it. Hence in cases of facial spasm the stretching should be as severe as the integrity of the nerve

will allow. And again the fact that the motor function of a mixed nerve is last lost is an additional reason for the maximum stretching that the nerve will bear. As Weir Mitchell also has shown that a nerve stretched to $^1/_5$ of its length lost its mechanical irritability but not its electrical, but that this last was also lost when the stretching reached $^1/_4$ of its length, this is also another reason for the greater degree of stretching. But this stretching should be gradual and not sudden.

The fact noted by Billroth that in crutch palsy, which is caused by direct pressure, the motor function is lost while sensibility remains, naturally raises the question as to whether pressure might not be advantageously substituted for stretching or, as in Baum's case, combined with it. Stretching first abolishes the sensory function, and the motor function last; while pressure reverses this and abolishes the motor function first. Zederbaum's careful experiments (Archiv Physiol. 1883, p. 161.) show that in the sciatic nerve of the frog, moderate pressure increased the irritability, the maximum being reached at 500 grams (a little over 1 ounce), but that at 900 grams (nearly two ounces), it began to diminish, and was lost at 1,700 grams (nearly four ounces). Baum is the only one who has used pressure as well as stretching, but the result was only a partial success.

The *after treatment* is simple. A few strands of horse-hair suffice for drainage, and with antiseptic dressing, the case should be well in a few days. In my own case the patient was out of bed on the third day; all the sutures were removed on the fourth day and she went home on the tenth day, having staid in the hospital voluntarily some days more than was absolutely needful. Her highest temperature was 100.4° on the day after the operation, being normal the next day. Rarely, if ever, should suppuration follow. In Godlee's first case the wound was not healed for six weeks.

I think it important to bandage the lower jaw for two or three days, to insure quiet while the wound is healing, and for the same reason to give only liquid food during several days in order to avoid the muscular effort and movements of mastication.

Results of the Operation.—The operation is free from danger;

no death has resulted; no serious complications, and, in fact, no serious illness. Paralysis of the facial muscles more or less complete both in degree and extent is always to be expected, indeed desired. But this paralysis has disappeared in every case after a few days, weeks or months, and in two cases (15, 19) in which prior to the operation paralysis had existed, some degeee of voluntary and electrical control was attained. Indeed, this fact together with the experimental results before referred to as to the effect of moderate stretching in increasing nerve irritability, lead me to suggest that it would be highly proper in some obstinate cases of facial palsy, to stretch the seventh nerve as a therapeutic operation.

In cases 2 and 18 no paralysis resulted, and in case 1 it disappeared in half an hour, yet, in cases 1 and 2 there was decided permanent improvement, and in case 18 a cure lasting for two years and eight months.

In such cases as have been examined electrically, the reactions of degeneration have been found, but these have diminished as the nerve was regenerated, and have disappeared after some months. This is also in accordance with the results of experimental nerve stretching in animals in which microscopic examinations have been made. More careful observations are, however, needed upon this point.

As the paralysis has disappeared and the nerve has regenerated, in not a few cases the spasms have returned, while in others the relief has extended over years. Hence, the operation may be regarded from two points of view: (1). As giving temporary relief (palliative) and (2). As giving permanent relief (curative).

As a palliative operation the result has been as follows:

Case 1. Absolute relief eight or nine months. Since then great relief; (2 years).

Case 2. Absolute relief one day. Since then slight improvement; (2 years).

Case 3. Absolute relief for six months, then return of spasm in lessened severity.

Case 4. Absolute relief for three months, then spasms returned with lessened severity; (3 years and 2 months).

Case 5. Absolute relief for nearly a year, when spasms returned.

Case 6. Absolute relief three months, then gradual return of spasms in lessened severity; (4 months).

Case 7. Absolute relief nine months, then return as bad as ever; (3 years).

Case 10. Bilateral operation. Absolute relief twelve weeks on both sides, then return of spasms; (2 years.)

Case 12. Absolute relief for some months, then spasms returned.

Case 14. Absolute relief seven months, then spasms returned in lessened severity; (10 months).

Case 15. Great improvement for three weeks; prior paralysis lessened.

Case 16. Tic douloureux and convulsif both; pains relieved for four days, then worse than before; spasms somewhat relieved.

Case 19. Absolute relief four months when spasms returned with lessened severity.

Case 20. Absolute relief for four days; on fifth day as bad ever; (4 months).

Or, in brief, fourteen cases with [1. Absolute relief under a week. Three cases followed by improvement for two years in one case and no improvement in the other two. [2. Absolute relief three weeks to four months.

Five cases followed by improvement in four cases, and no improvement in one.

3. Absolute relief four months to a year.

Six cases followed by improvement in three, and no improvement in three.

As a palliative operation only, therefore, it is well worth doing since at no risk of life and but little suffering, the relief is often prolonged and if the spasms return it is with lessened severity. Indeed, my own patient would gladly undergo it again for even the brief respite so far assured, and far prefers a permanent paralysis to the persistent spasms.

II. As a means of permanent cure, we have the following.

Case 8. Absolute relief for five years.

Case 9. Absolute cure or very great improvement (it is not quite clear which) for twenty-five months.

Case 13. Absolute relief for three months when last reported.

Case 17. Absolute relief for three months.

Case 18. Absolute relief for two years and eight months.

Or, in brief, two cases of relief, when last reported, for three months, and three of relief for from two to five years.

Of the remaining two cases Navratil's (11) was only followed for three days, and in my own, (21) though the result is perfect so far, yet, as it is only twenty-five days since the operation, it is too recent to classify. [Still cured as the proofsheets are corrected two and a half months after operation.]

It would seem, therefore, that whether viewed from the point of palliation or of cure, the operation is, with our present knowledge, to be looked upon favorably. Further observation may show its inutility, but when we consider the utter hopelessness of improvement, much less recovery, from any other means, relief by this operation, even if temporary, is had at a very trivial cost, and would be welcomed by any sufferer, while permanent cure is not impossible.